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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/909,809	07/23/2001	Mayumi Tomikawa	522.1921D3	6031

21171 7590 05/16/2006

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EXAMINER

DEJONG, ERIC S

ART UNIT	PAPER NUMBER
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1631

DATE MAILED: 05/16/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/909,809	Applicant(s) TOMIKAWA ET AL.	
	Examiner Eric S. DeJong	Art Unit 1631	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 06 March 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 16, 17 and 23-26 is/are pending in the application.
- 4a) Of the above claim(s) 26 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 16, 17 and 23-25 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED OFFICE ACTION

Claim Rejections - 35 USC § 101

In regards to claims 16, 17, and 23-25, the instant claims are drawn computational methods and related apparatuses and computer programs for determining spatially similar portions of substance by analyzing three-dimensional structures. The claimed methods and related apparatuses and computer programs are non-statutory unless the claims include a step of physical transformation, or if the claims include a useful, tangible and concrete result. It is important to note, that the claims themselves must include a physical transformation step or an useful, tangible and concrete result in order for the claimed invention to be statutory. It is not sufficient that a physical transformation step or a useful, tangible, and concrete result be asserted in the specification for the claims to be statutory. In the instant claims, there is no step of physical transformation, thus the Examiner must determine if the instant claims include a useful, tangible, and concrete result.

In determining if the instant claims are useful, tangible, and concrete, the Examiner must determine each standard individually. For a claim to be "useful," the claim must produce a result that is specific, substantial, and credible. For a claim to be "tangible," the claim must set forth a practical application of the invention that produces a real-world result. For a claim to be "concrete," the process must have a result that can be substantially repeatable or the process must substantially produce the same result again. Furthermore, the claim must recite a useful, tangible, and concrete result

in the claim itself, and the claim must be limited only to statutory embodiments. Thus, if the claim is broader than the statutory embodiments of the claim, the Examiner must reject the claim as non-statutory.

The instant claims do not include any tangible result. A tangible result requires that the claim must set forth a practical application of the mathematical algorithm to produce a real-world result. The instant claims recite the steps of dividing a second structure, determining whether a correspondence is present, determining whether point sets have a same attribute, calculating a RMSD between corresponding elements in said point sets, and determining a length of a longest common sequence. However, these steps only suggest that the above described determinations and calculations have been performed without further requiring that a result is communicated to a practitioner the instantly claimed invention. Further, the instant claims do not require performing any step involving a physical transformation, such as physically performing an NMR or X-RAY experimentation on a real-world protein sample that would result in the generation of three-dimensional structural data for use in the instant claims. Therefore, the instant claims do not include any tangible result.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 16, 17, and 23-25 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Where applicant acts as his or her own lexicographer to specifically define a term of a claim contrary to its ordinary meaning, the written description must clearly redefine the claim term and set forth the uncommon definition so as to put one reasonably skilled in the art on notice that the applicant intended to so redefine that claim term. *Process Control Corp. v. HydReclaim Corp.*, 190 F.3d 1350, 1357, 52 USPQ2d 1029, 1033 (Fed. Cir. 1999). The term "RMSD" in claims 16, 23, and 24 is used by the claim to mean "root mean square distance", while the accepted meaning is "root mean square deviation." The term "RMSD" is indefinite because the instant specification does not clearly redefine the term. It is acknowledged that the instant specification page 4, lines 27-30 states:

"When the researcher searches the similar three-dimensional, structure, an r.m.s.d. (root mean square distance) value is used as a scale of the similarity of the three-dimensional structures of the substances."

However, this teaching from the instant disclosure conflicts with the equation (1) provided page 5, lines 20-23 of the instant specification as it sets forth an equation for determining root mean square deviation. As such, applicants have not clearly redefined the claim term RMSD as a "root mean square distance" and set forth the uncommon

definition so as to put one reasonably skilled in the art on notice that the applicant intended to so redefine that claim term.

Claims 16, 23, and 24 each recite "determining spatially similar portions of substances by analyzing three-dimensional structures of a substance" (see for example in lines 2 and 3 of claim 16). The instant claims further recite that the determination of similarity involves a comparison of probe and target structures and subsets thereof using point sets derived from amino acid sequences from either probe or target structures. As such the instant claims are rendered indefinite because not all substances with a corresponding three-dimensional structure have an associated amino acid sequence. For example, small chemical molecules, nucleic acid sequences (DNA and RNA), and carbon-nanotube structures, which are all substances that have known three-dimensional structures but do not contain any amino acids nor are they necessarily associated with an amino acid sequence.

For the purpose of continuing examination, it has been construed that the substances analyzed by the instantly claimed invention read only on biological molecules which comprise amino acids, such as peptides, proteins, and protein-nucleic acid fusion constructs (PNA).

Claims 16, 23, and 24 each recite the limitation of "a first probe structure expressed by three-dimensional coordinates of elements belonging to a first probe subset of a plurality of subsets of secondary structure of probe structures, the first

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subset comprising a first point set of an amino acid sequence or a motif database" (see for example lines 3-6 of claim 16). In the above cited limitation, the recitation of "a first probe subset of a plurality of subsets of secondary probe structures" is initially unclear because the instant claims do not define an initial set from which the subsets are determined from. As such, is unclear what the instantly claimed "subsets" are subsets of. Further, it is unclear in the above cited limitation as to what relationship the "first probe structure" has with probe structures recited in "a plurality of subsets of secondary probe structures". For example, it is unclear if the "secondary probe structures" are intended to be functionally related to "the first probe structure" as in the case of a specific protein from within a generic family of proteins (ex: cytochrome c3 is a specific protein from within a family of cytochrome proteins) or, alternatively, if the "secondary probe structures" are intended to encompass the three dimensional structures of secondary structural motifs (such as alpha helices and beta sheets) that are components of a parent "first probe structure". It is further unclear from the above cited limitation what information is intended to be included in "a first point set of an amino acid sequence database or motif database". For example, it is unclear if applicants intend a "first point set" to be a collection of atomic coordinates for atoms within amino acid sequence, a collection of node positions that are used in constructing a first tree structure, or, alternatively, encompass more abstract structural constructs such as an averaged/localized positions of protein-ligand binding sites or catalytic protein domains present in the first probe structure.

Similarly, claims 16, 23, and 24 each recite the limitation of “a second target structure expressed by three-dimensional coordinates of elements belonging to a second subset of a plurality of subsets of secondary structures of the target structure, the second subset comprising a second point set of an input amino acid sequence of the target structure” (see for example lines 6-9 of claim 16). In the above cited limitation, the recitation of “a second probe subset of a plurality of subsets of secondary of the target structure” is initially unclear because the instant claims do not define an initial set from which the subsets are determined from. As such, is unclear what the instantly claimed “subsets” are subsets of. Further, the recitation of “a second target structure” implies the involvement of a first target structure, however there is no reference in the instant claim to any such first target structure. It is further unclear from the above cited limitation what information is intended to be included in “a second point set of an input amino acid sequence of the target structure”. For example, it is unclear if applicants intend a “second point set” to be a collection of atomic coordinates for atoms within amino acids, a collection of node positions that are used in constructing a second tree structure, or ,alternatively, encompass more abstract structural constructs such as an averaged/localized positions of protein-ligand binding sites or catalytic protein domains present in the second target structure.

Claims 16, 23, and 24 each recite the limitation of “dividing the second target structure into a plurality of second subsets based on secondary structures of the three-dimensional coordinates of the target structure” (in lines 10 and 11 of claim 16). It is

unclear from the instant claim how the resultant “plurality of second subsets” differs from the previously defined “second subset of a plurality of subsets of secondary structures of the target structure” as previously recited in the instant claims (see for example lines 7 and 8 of claim 16) or if the claimed step drawn to “dividing the second target structure into a plurality of subsets” results in the generation of a distinct set of subset structures. As such the metes and bounds of the above cited limitation is unclear. Further, it has been construed that the limitation of “the second structure” (see for example line 10 of claim 16) refers only to the previous recitation of “a second target structure” (see for example line 6 of claim 16).

Claims 16, 23, and 24 each recite a step drawn to determining whether a correspondence is present between the first point set and the second point set by generating (i) generating a first tree structure for the first point set and a second tree structure for the second point set, (ii) pruning the second tree structure for the second point set, (iii) determining whether the first point set and the second point set have a same attribute, and (iv), if the first point set and the second point set have a same attribute, generating a correspondence between the first point set and the second point set (see for example lines 15-29 of claim 16). These steps are initially unclear because it cannot be ascertained what kind of attributes can be associated to a first or second point set, as the claims fail to specify what information is encompassed by either a first or second point set. Further, the instant claims do define what an “attribute” is intended to encompass. For example, it is unclear if applicants intend that an attribute associated

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with a given point set reads on biological characteristics (such a structural motif, a ligand binding site, or a catalytic function) or, alternatively, that an attribute associated with a given point set reads on structural similarities between a given set of atomic coordinates. Further, as claimed the step of “determining whether a correspondence is present between the first point set of the probe structure and the second point set of the plurality of second subsets of the target structure” (see for example lines 19-17 of claim 16) is ultimately determined by “generating a correspondence between a first point set of the probe structure and the second point set of the plurality of second subsets of the target structure” (see for example lines 27-29 of claim 16). As such, the claim fails to delineate any positive steps that results in generating a correspondence. Additionally, it is unclear from the instant claims how the steps drawn to generating and pruning a first and a second tree structure is related to generating correspondences between a first and second point set.

Claims 16, 23, and 24 each recite the limitation of “calculating a root mean square distance (RMSD) between elements corresponding in the first point set of the probe structure and the second point set of the plurality of second subsets of the target structure to automatically determine a distance between the elements of the first point set and the elements of a second point set”. The instant limitation is vague and indefinite as it is uncertain what information is included in either a first or second point set. The indefiniteness issue is further compounded because it is unclear what the scope of an “element” from a “point set” is intended to encompass, and as such it is

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unclear what information is being relied upon in performing an RMSD calculation.

Further, as noted above, the term RMSD in the art of structural biology refers to a calculated root mean square deviation that quantifies the variability between a set of at least two or more structures, and as such does not result in any determination of a actual distance between corresponding elements from a first point set and a second point set.

Claims 16, 23, and 24 each recite the limitation of “a predetermined threshold value” (see for example lines 40 and 41 of claim 16). This limitation is unclear as the instant claims do not set forth what “a predetermined threshold value” is predetermined with respect to.

Claims 16, 23, and 24 each recite the limitation of “a character sequence expressing the input amino acid sequence” (see for example lines 45 and 46 of claim 16) and “ a character sequence expressing the amino acid sequence” (see for example lines 46 and 47 of claim 16). It is unclear from the instant limitations if “a character sequence expressing” an amino acid sequence is directed to a DNA sequence that expresses an amino acid product in the context of biological transcription and translation, or alternatively, if a “character sequence expressing” an amino acid sequence is directed to a three dimensional structure of an amino acid sequence, such as a probe structure expressed by three-dimensional structure coordinates (see for example, line 3 of claim 16).

Claims 17 and 25 are also included under the above rejections due to their dependence from either of claims 16 or 24.

Claim Rejections - 35 USC § 102

The rejection of claims 16, 17, and 23-25 35 U.S.C. 102(b) as being anticipated by Pantoliano et al. or Holak et al. or Flaherty et al. or Mosimann et al. is withdrawn in view of amendments made to the instant claims.

Double Patenting

Regarding use of the specification in obviousness-type double patenting rejections, the MPEP states in section 804:

When considering whether the invention defined in a claim of an application is an obvious variation of the invention defined in the claim of a patent, the disclosure of the patent may not be used as prior art. This does not mean that one is precluded from all use of the patent disclosure.

The specification can always be used as a dictionary to learn the meaning of a term in the patent claim. In re Boylan, 392 F.2d 1017, 157 USPQ 370 (CCPA 1968). Further, those portions of the specification which provide support for the patent claims may also be examined and considered when addressing the issue of whether a claim in the application defines an obvious variation of an invention claimed in the patent. In re Vogel, 422 F.2d 438, 441-42, 164 USPQ 619, 622 (CCPA 1970). The court in Vogel recognized "that it is most difficult, if not meaningless, to try to say what is or is not an

obvious variation of a claim,” but that one can judge whether or not the invention claimed in an application is an obvious variation of an embodiment disclosed in the patent which provides support for the patent claim. According to the court, one must first “determine how much of the patent disclosure pertains to the invention claimed in the patent” because only “[t]his portion of the specification supports the patent claims and may be considered.” The court pointed out that “this use of the disclosure is not in contravention of the cases forbidding its use as prior art, nor is it applying the patent as a reference under 35 U.S.C. 103, since only the disclosure of the invention claimed in the patent may be examined.”

Claims 16, 17 and 23 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claim 13 of copending Application No. 09/910,071. Although the conflicting claims are not identical, they are not patentably distinct from each other because copending claim 13 recites a generic method for analyzing three dimensional structures comprising dividing point sets from three dimensional coordinates, generating a combination of correspondence, and calculating a root mean square distance, as instantly claimed. The instant claims are more narrowly drawn to further generating a first and second tree structure, pruning the second tree structure, and determining the optimum correspondence between the elements. However, the disclosure of copending application No. 09/910,071 teaches a preferred embodiment of the generic method which further comprises the steps of generating a first and second tree structure, pruning the second tree structure, and determining the optimum correspondence between the elements (see the specification

of copending application No. 09/910,071, pages 8 line 21 through page 9, line 19 and page 54, line 13 through page 55, line 7).

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

Conclusion

Any inquiry of a general nature or relating to the status of this application should be directed to Legal Instrument Examiner, Tina Plunkett, whose telephone number is (571) 272-0549.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Eric S. DeJong whose telephone number is (571) 272-6099. The examiner can normally be reached on 8:30AM-5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Andrew Wang, can be reached on (571) 272-0811. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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John S. Brusca 12 May 2006
JOHN S. BRUSCA, PH.D
PRIMARY EXAMINER